St Catherine's CE Primary

LEARN TOGETHER, SHINE TOGETHER

Year Three Calculations Policy

YEAR 3

MAIN PRINCIPLES

What is maths mastery?

Teaching maths for mastery is a transformational approach to maths teaching which stems from high performing Asian nations such as Singapore. When taught to master maths, children develop their mathematical fluency without resorting to rote learning and are able to solve non-routine maths problems without having to memorise procedures.

Concrete, pictorial, abstract (CPA)

Concrete, pictorial, abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths. Developed by American psychologist, Jerome Bruner, the CPA approach is essential to maths teaching in Singapore.

Number bonds

Number bonds are a way of showing how numbers can be combined or split up. They are used to reflect the 'part-part-whole' relationship of numbers.

Bar modelling

The bar model method is a strategy used by children to visualise mathematical concepts and solve problems. The method is a way to represent a situation in a word problem, usually using rectangles.

Fractions

In Singapore, the understanding of fractions is rooted in the Concrete, Pictorial, Abstract (CPA) model, where children use paper squares and strips to learn the link between the concrete and the abstract. At the heart of understanding fractions is the ability to understand that we're giving an equal part a name.

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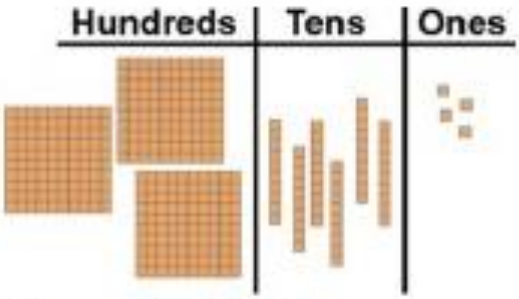
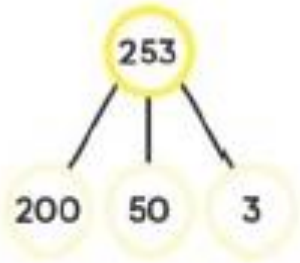
PLACE VALUE

Base ten or dienes blocks:



Number bond method:



Value of digits:

hundreds	tens	ones
4	2	7

427 = 4 hundreds + 2 tens + 7 ones
427 = 400 + 20 + 7

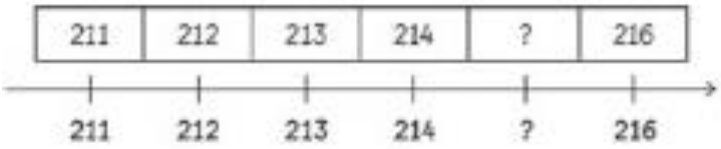
The digit 4 stands for 4 hundreds or 400.
The digit 2 stands for 2 tens or 20.
The digit 7 stands for 7 ones or 7.

We write 427 as four hundred and twenty-seven.

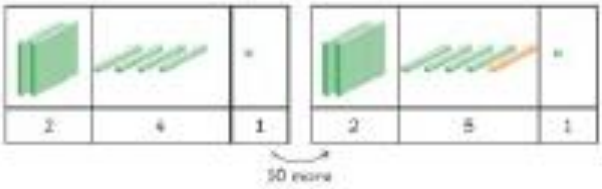
Place value cards:

Separating the numbers apart like this is called **partitioning.**

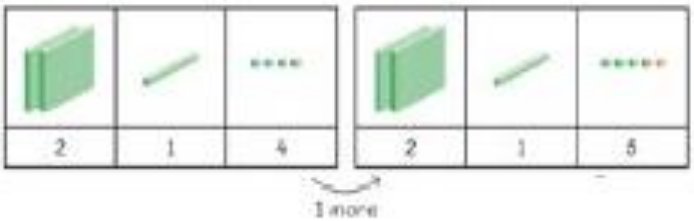
Number lines:



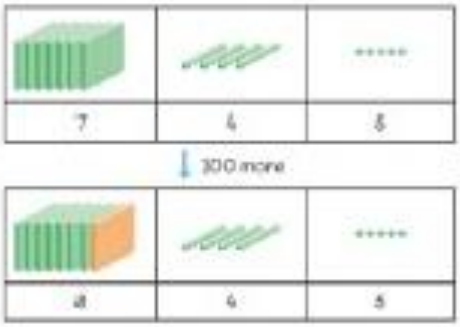
Finding 10 more or less than:



Finding 1 more or less than:



Finding 100 more or less:



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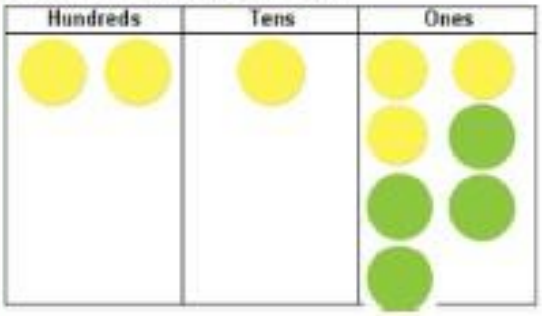
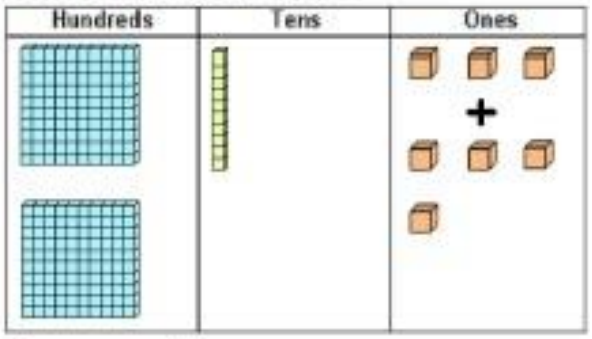
ADDITION

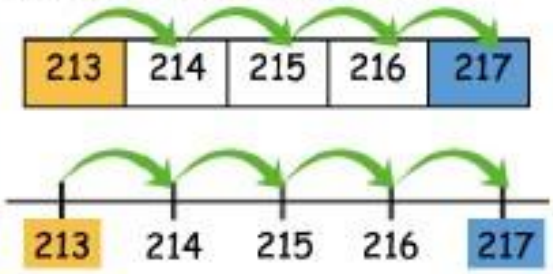
Counters method:



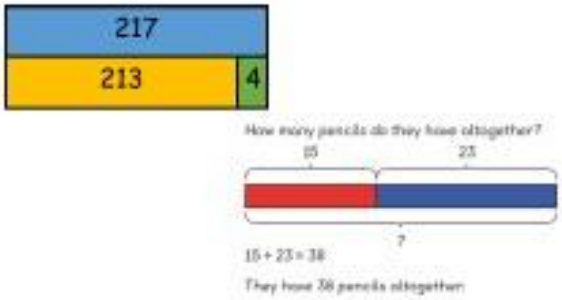
Base 10 method:



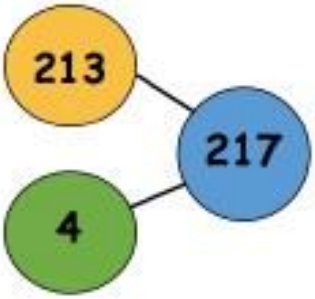
Number line method:



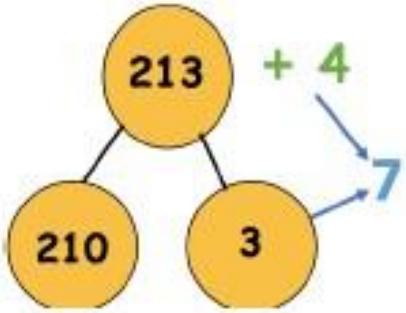
Bar model:



Number bond method:



Number bond method:



210
+ 7

Abstract calculations:

Commutative	Inverse
213 + 4 = 217	217 - 4 = 213
4 + 213 = 217	217 - 213 = 4

Column addition:

Without renaming:

$$\begin{array}{r} 213 \\ +\ \ 4 \\ \hline 217 \end{array}$$

With renaming:

$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ } \\ 213 \\ +\ 497 \\ \hline 710 \end{array}$$

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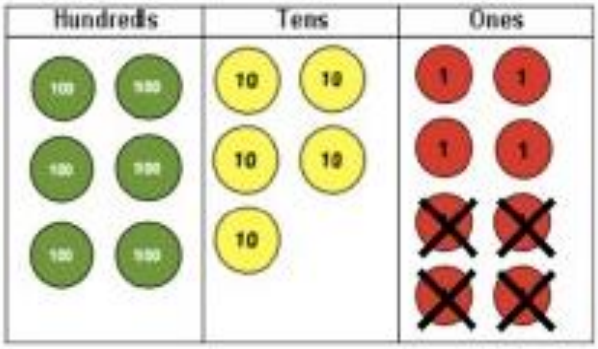
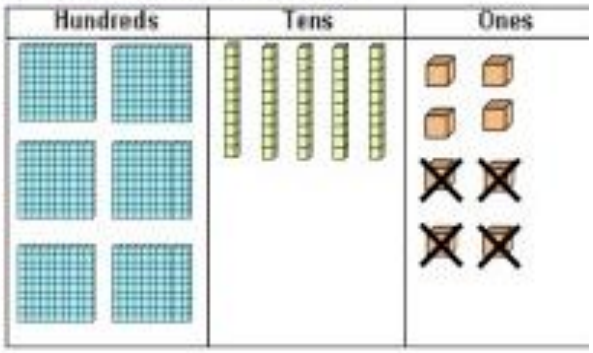
SUBTRACTION

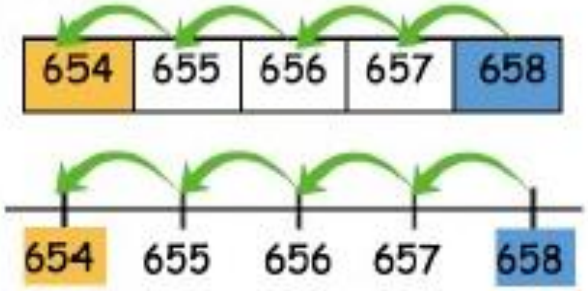
Counters method:



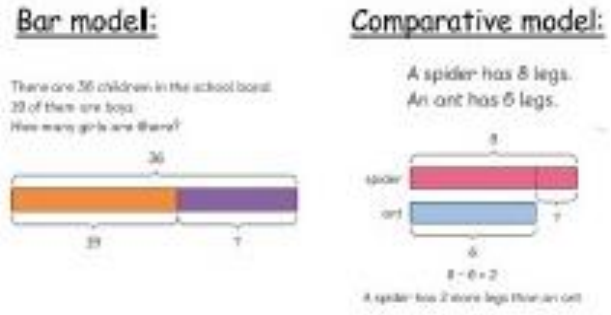
Base 10 method:



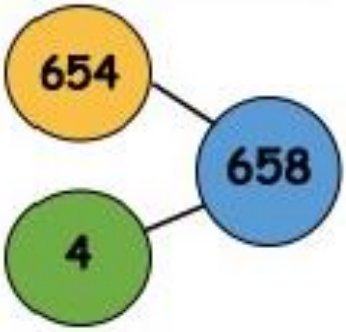
Number line method:



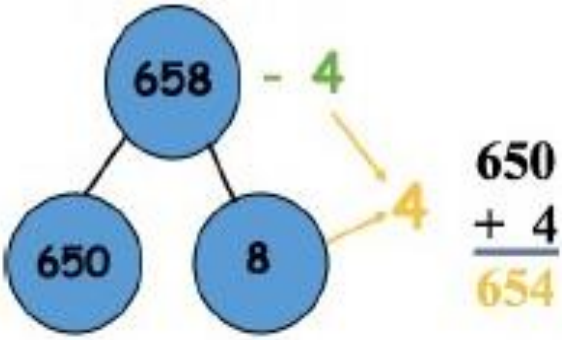
Bar models:



Number bond method:



Number bond method:



Abstract calculations:

Commutative	Inverse
658 - 4 = 654	654 + 4 = 658
658 - 654 = 4	4 + 654 = 658

Column subtraction:

Without renaming:

$$\begin{array}{r} 658 \\ -\ \ 4 \\ \hline 654 \end{array}$$

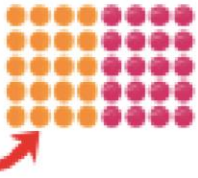
With renaming:

$$\begin{array}{r} 6\,\overset{4}{\cancel{5}}\,\overset{1}{8} \\ -\ 349 \\ \hline 309 \end{array}$$

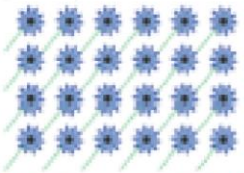
YEAR 3

MULTIPLICATION

Arrays:

3 times tables	4 times tables	8 times tables
		
3 x 5 = 15	4 x 5 = 20	8 x 5 = 40 (doubling the 4 times tables)

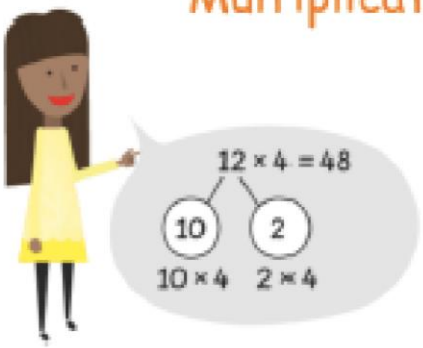
Make a family of multiplication and division facts:



6 × 4 = 24 —— 24 ÷ 6 = 4

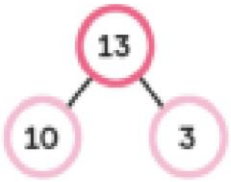
4 × 6 = 24 —— 24 ÷ 4 = 6

Number bond strategy:
Multiplication



Bridged column method:
Without renaming

13 × 3 = 39



	t	o
	1	3
×		3
		9
+	3	0
	3	9

Bridged column method:
With renaming

Multiply the ones by 4.

	t	o
	2	5
×		4
	2	0

5 ones × 4 = 20 ones
20 ones = 2 tens

Multiply the tens by 4.

	t	o
	2	5
×		4
	2	0
	8	0

2 tens × 4 = 8 tens

Add the products.

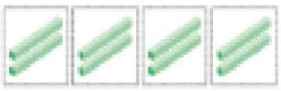
	h	t	o
		2	5
×			4
		2	0
+		8	0
	1	0	0

20 + 80 = 100

Short multiplication:
Without renaming

2 x 4 = 8

2 x 40 = 80



	t	o
	2	0
×		4
	8	0

Short multiplication:
With renaming

Multiply the ones by 4.

2 tens

	t	o
	2 4	7
×		4
		8

8 ones

7 ones × 4 = 28 ones
28 ones = 2 tens + 8 ones

Multiply the tens by 4.

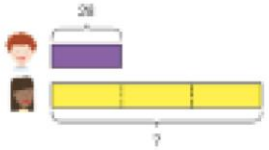
	h	t	o
		2 4	7
×			4
	1	8	8

4 tens × 4 = 16 tens
16 tens + 2 tens = 18 tens

Solving word problems:
Bar model

There are 28 boys in a group.
There are 3 times as many girls as there are boys.

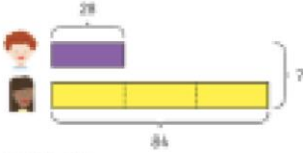
(a) How many girls are there?



28 × 3 = 84

There are 84 girls.

(b) How many children are there?



28 + 84 = 112

There are 112 children altogether.

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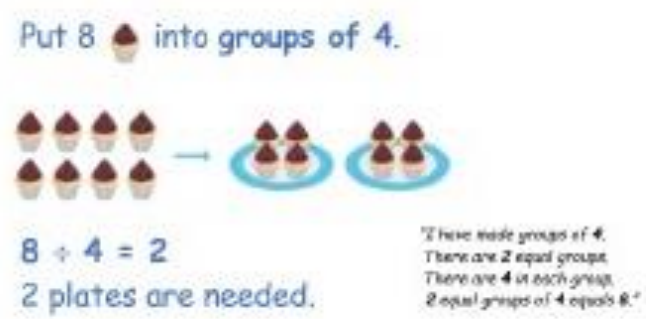
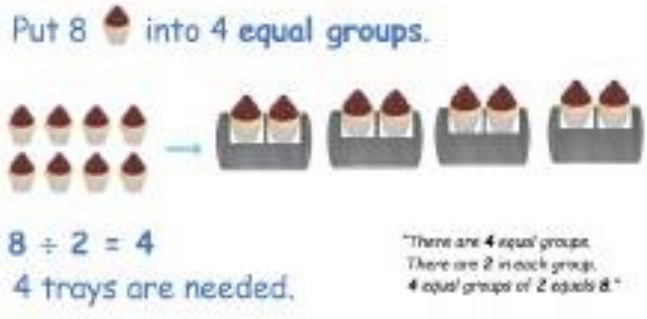
DIVISION

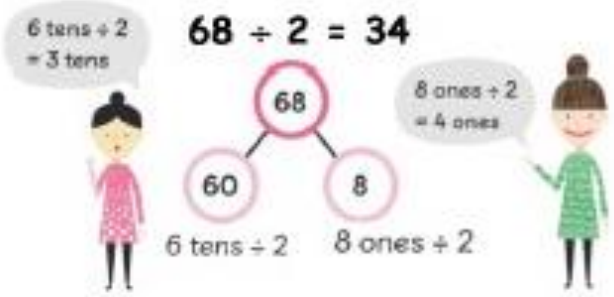
Grouping: 'groups of'



Grouping: 'equal groups'

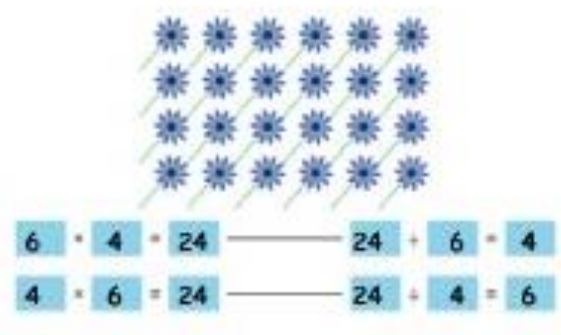


Number bond strategy: Division



Solving word problems: *Bar model*

Make a family of multiplication and division facts:



Number bond and long division: